What are the dimensions of the solar system?

Have you ever imagined how long it would take to travel to other planets in the solar system? If you travel beyond Mars, the distances between the orbits of the planets becomes very great. It would take several years to travel to the most distant planets in our solar system.

The solar system is made up of nine planets\* and other objects that orbit the sun. These orbits are elliptical, so a planet’s distance from the sun will vary. The movement of a planet around the sun is known as its revolution. As planets orbit around the sun they also spin on their axes. The spinning of a planet on its axis is known as its rotation. (\*NOTE – This is an older activity that still includes Pluto as a planet ----- play along ☺)

Planets do not all revolve around the sun and rotate in the same way. For instance, the planets Uranus and Venus display retrograde motion. That means they rotate clockwise rather than counterclockwise like other planets. In addition, the axis of Uranus is nearly parallel to the plane of its orbit. Its direction of rotation is nearly at a right angle to its direction of revolution.

The four planets closest to the sun (Mercury, Venus, Earth, and Mars) are known as the inner planets. The asteroid belt lies between the orbits of Mars and Jupiter. The planets whose orbits lie beyond the asteroid belt are called the outer planets.

This Virtual Lab will demonstrate the vast distances between the planets and the relative sizes of the planets. The diameter measurements and travel times are approximate. The times assume that you are traveling in a straight line from the sun to the destination planet, and the distance traveled is the average distance of the planet from the sun.

Objectives:

* Calculate the approximate diameters of planets in the solar system from scaled illustrations.
* Compare the approximate distances of planets from the sun.

Procedure: FIRST – prepare a data table (see below)

1. Click the Video button to watch the demonstration.
2. Click the Solar System Guide button to learn interesting facts about the solar system
3. Choose a destination from the Destination menu.
4. Click the Ignition button to launch your flight.
5. Once the spacecraft stops, click the Scale On button and use the scale to measure the diameter of the planet.
6. Record the approximate diameter of the planet in the Table.
7. Measure and record the approximate distance from the sun.
8. Click Return to Sun and repeat steps 3 through 7 for the other planets.
9. Use the data from the Table to draw conclusions and complete the questions.

Data Table: Prepare a data table with enough rows to describe all nine planets

The Dimensions of the Solar System

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Planet Name | Average Distance from the Sun (AU) | Approximate Travel Time (yrs) | Approximate Diameter (km) | Order of planet from Sun (1-9) |
|  |  |  |  |  |
|  |  |  |  |  |
| (Continue……. |  |  |  |  |

Questions:

1. What shape do the orbits of planets have?
2. What is a planet revolution?
3. What is a planet rotation?
4. What is retrograde motion?
5. Which planets display retrograde motion?
6. What are the names of the inner planets?
7. Where is the asteroid belt?
8. What are the names of the outer planets?
9. How do the sizes of the inner planets (from the Sun to the asteroid belt) compare to the sizes of outer planets?
10. How do the distances between the orbits of the inner planets compare to the distances between the orbits of the outer planets?
11. How many times larger than Earth is the planet Jupiter?
12. How many times larger than Pluto is planet Earth?
13. How much farther from the sun is the orbit of Neptune than the orbit of Earth?
14. What makes human travel to the other planets in our solar system difficult?
15. Choose a planet and provide two reasons why you would like to visit it.
16. Which planet is the only one not visited by a spacecraft?
17. How thick are Saturn’s rings?
18. Why is Neptune blue?
19. What is the brightest object in the sky – except for the sun and moon - ?
20. Which planet has the largest mountain in the solar system?
    1. What is the name of the mountain?
    2. How tall is it?

Data Table/Graph

1. Create a data table of the mean temperatures of the 9 planets – with headings.
2. Create a graph of the temperatures of the 9 planets – with titles and labels. (Be sure to have an accurate scale and have the graph cover ¾ of the graph paper)